



# Currency rate and the Cycle of Money theory

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## Abstract

This paper explains the fundamental concepts of the Cycle of Money theory. It examines an economy as a whole; therefore, the structure of the economy and the distribution of money in the economy are evaluated in terms of how they interact. The objective of this paper is to show the relationship between the Cycle of Money theory, the exchange rate, and inflation. Inflation is the result not only of rising prices but also of a mismatch between price growth and productivity. Productivity in the Cycle of Money theory refers to the distribution and reuse of money in an economy. The depiction of an economy is made through its function and structure, something that is reflected in the money cycle, i.e. problems in the functioning of the economy appear in the structure of the economy and vice versa – productivity and the structure of the economy are two sides of the same coin, which means that they are inextricably linked to each other. Inflation leads to a reduction in the money cycle, which is also reflected in the reduced exchange rate. In deflation, the previous pattern is the same. In the case of Domism, meaning that the economy has appropriate function and structure, it is plausible to decrease inflation and increase the currency rate together with productivity.

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## Keywords

- currency rate
- exchange rate
- inflation
- the Cycle of Money Theory

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## Introduction

The paper evaluates the economic functionality of an economy through the distribution and reuse of money, allowing us to comprehend the structure of each economy. The final scope is to define the affiliation between the currency rate and the cycle of money from the view of the money that is in an economy (i.e. how it functions in it). In many circumstances, a sum of money is transferred from one economy to another through external banks or other economies. The basic perspective during the money cycle is that in most cases large, international corporations save their money in external banks and financial havens.

Therefore, according to this theory, the tax authorities should impose an additional tax on such a type of corporation to reduce losses in the economy. In addition, smaller companies and freelancers should be taxed at lower tax rates. This way, it would be possible to increase the dynamics of the economy (Challoumis, 2018b, 2019a, 2019b, 2019e, 2021a, 2021f). Factories and know-how services are exceptional situations of the economy since they belong to those circumstances where taxes improve the economy's quality (Adhikari et al., 2006; AICPA, 2017; Al-Ubaydli et al., 2021; Altman, 2008; Amanor-Boadu et al., 2014; Anderson et al., 2020; Andriansyah et al., 2019; Androniceanu et al., 2019; Anguera-Torrell et al., 2020). Factories and huge know-how firms improve the money cycle if they do not replace the activities of small and medium-sized businesses and self-employed people. Education and healthcare systems improve the quality of the economy, generally improving the whole economy (Anderson et al., 2020; Evans et al., 1999; Hausman et al., 2016; Jia et al., 2020; Kiktenko, 2020; Schram, 2018). This study aims to demonstrate that inflation is caused not only by rising prices but also by a mismatch between price growth and productivity growth. In the theory of the money cycle, productivity refers to the distribution and reuse of money in an economy. The depiction of an economy is made through its function and structure, something that is reflected in the money cycle, i.e. problems in the functioning of the economy appear in the structure of the economy and vice versa – productivity and the structure of the economy are two sides of the same coin, i.e. they are inextricably linked to each other. Inflation reduces the money cycle, which is reflected by lowering of the exchange rate by.

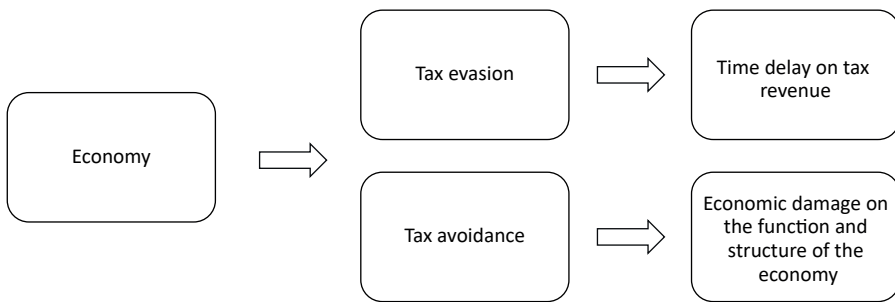
Some of the theses of the Cycle of Money theory (Challoumis, 2018c, 2022b):

1. The credibility of a tax system affects its stability by influencing business behavior in general. Companies engaged in controlled transactions are encouraged to do so, i.e. an unreliable tax system favors companies engaged in controlled transactions to avoid being taxed. In contrast, companies that are consistent and operate without making controlled transactions avoid being fully taxed.

2. GDP includes the value of the final product without the added value of each stage, but never of the intermediate stages. GDP is the total added value of production of all enterprises in the economy.
3. GDP does not include the value of production related to own consumption because it is not traded. However, this is addressed by CM, since saving is taken into account not only in the context of investment but also in all forms of consumption.
4. GDP is a quantitative indicator and not a qualitative one. The Cycle of Money theory makes a breakthrough in this context because it shows the economy as a single economic body that reflects society, i.e. it concerns first of all the qualitative elements shown by the money cycle index.
5. GDP ignores the composition and distribution of output. Small and medium-sized enterprises should have lower taxes than large ones. Larger companies should not replace activities that smaller companies can do. This strengthens the local and domestic banking system and does not save money outside a country's economy. Large corporations usually save money in tax havens because of super-profits, reducing the liquidity of an economy.
6. GDP does not include the value of goods in the shadow economy. The Cycle of Money theory solves this issue because tax evasion and black money, as long as they do not escape the economy, do not cause any damage to the economy. It is simply postponed in time as at some point it will be taxed either by direct or indirect taxes. At the same time, black money related to tax evasion is cash that will be reused without reducing the dynamics of an economy. On the contrary, tax avoidance concerns large companies, which usually save their money in tax havens reducing the liquidity of an economy.
7. The Cycle of Money theory is an evolution of GDP, as it is the marginal state of GDP, which reveals that an economic system is like a body, with money to be its blood.
8. The Cycle of Money theory reduces inflation because there is no need to raise prices to address structural problems of an economy, thus relieving the economy of the need for additional liquidity through currency devaluation. In addition to the structural problems faced by the theory in question, it also affects the stability of an economy by ridding it of inflationary problems.
9. The implementation of the money cycle enables improving the structure of the economy, which is reflected in the distribution and reuse of money in an economy.
10. It is found that tax avoidance mainly causes economic damage to the distribution of money, while tax evasion mainly delays the distribution of money.

## 1. Literature review

The trustworthiness of a tax system affects its stability, which influences corporate conduct in general. If there is no trustworthiness, corporations engaged in controlled transactions are incentivized to engage in this activity, i.e. an untrustworthy tax system encourages companies engaging in controlled transactions to avoid being taxed. On the other hand, companies that are consistent and do not engage in controlled transactions are completely taxed in this case (Figure 1).



**Figure 1. Tax evasion and avoidance in the Cycle of Money theory**

Source: author’s own elaboration.

The concept of the money cycle indicates that taxes return to the economy in the case of education and the health care system (these are exceptions to the dominant approach of the money cycle where taxes do not support the economy). However, the consensus is that tax authorities should keep taxes as low as possible (Challoumis, 2018a, 2019c, 2019d, 2020b, 2020c, 2021b, 2022b). The government should protect small and medium-sized businesses with exceptionally low taxes while imposing higher taxes on larger corporations. However, some huge and international enterprises should pay lower tax rates because their operations are not a substitute for those of smaller businesses. Large enterprises with technological know-how are examples of this category.

The general international Money Cycle Index (0.5) represents the global average. Countries whose index amounts to 0.5 or above have an adequate money allocation in their financial system (Challoumis, 2018c, 2018e, 2019f, 2019g, 2021c, 2021g, 2021h). The authorities by lowering taxes on small and medium-sized enterprises achieve the best reuse of money in a country’s economic system. Additionally must be raised the taxes on large and international corporations that proceed to controlled transactions and save their money in banking systems outside the countries in which they operate. Empirically the CM defines that every 0.1 corresponds to 2–4 years of an economy to recover from a crisis. For in-

stance, an economy with an index of the cycle of money amounting to 0.9 needs two years to recover. A stricter approach corresponds to the value of 0.1 to 3–5 years (empirically achieved by prior depressions and paradigms from countries that faced financial crises).

The Cycle of Money theory is a hypothesis that can disclose the economic dynamics of an economic system and its ability to deal with a crisis. The circle of money theory is an economic system from a holistic perspective of economics. This is accomplished by using GDP to define the concept of money as well as how it circulates throughout the economy. Money could be compared to “blood” in an “organism”, and economic units to “parts of the body” in an allegorical metaphor. Then, just as medical tests for “blood”, money indicates reasonable abnormalities in the economy. The same thing occurs from a different perspective (Béland, 2017; Castaño et al., 2016; Challoumis, 2020b; de Queiroz & Capelari, 2020; Forson, 2020; Hartz & John, 2009; Haskel & Westlake, 2021; Jeon et al., 2020; Khan & Liu, 2019; Nowlin et al., 2020; Schwartz, 2019; Waardenburg et al., 2020).

As a result, the money cycle theory offers a comprehensive picture of the performance and condition of an economy and then demonstrates whether it can respond to a potential economic catastrophe (e.g. the indicator of the money cycle in the case of Greece can explain why the economy was able to cope with its ten-year economic crisis when other indicators did not manage to do this) (Baldwin et al., 2011; Cascajo et al., 2018; de A. Dantas et al., 2018; Evans et al., 1999; Ginsburgh & Weber, 2020; Grove et al., 2020; Kreft & Sobel, 2005; Limberg, 2020; Maxwell, 2020; Miljand, 2020; Mohindra, 2007; Naudé & Dimitri, 2020; Ng, 2018; OECD, 2020; Rizzo & Throsby, 2006; Romme & Meijer, 2020; Wangsness et al., 2020).

The way money moves and is allocated in an economy reveals how well that economy is structured. When a body loses a lot of “blood” (money in the economy), the “body parts” grow weaker and the “organism” (the economy) weakens. The opposite happens when money enters an economy. In this instance, the “blood” (money) gets only to a section of the “organism”, the body part which will be much better, but the “organism” will be weaker overall, i.e. the economy will be weaker. That is why the theory of the circle of money was successful in “predicting” years ago the existence of an international minimum tax rate for corporations involved in internationally controlled activities.

The current findings, which are based on the theoretical approach of the theory of the money cycle, demonstrate that in the economy taxes benefit primarily, or even solely, the health and education systems. In addition, the basic tenet of the CM theory is that governments should keep taxes on medium and small economic entities (i.e. any type of economic entity, such as freelancers, companies, etc.) and businesses as low as is reasonable. Furthermore, the examples of Poland, Latvia, Serbia, Bulgaria, Greece, Thailand, and Ukraine show that they are above the cutoff of 0.2 and nearly at the average rate of 0.5, indicating that

these countries may experience a crisis (Bhuiyan & Farazmand, 2020; Biernaski & Silva, 2018; Blekesaune, 2007; Blundell & Preston, 2019; Bourdin & Nadou, 2018; Bowling et al., 2019; Brownell & Frieden, 2009; Burstein, 2020; Cai, 2017; Camous & Gimber, 2018).

The money cycle is a good place to apply the FLP (Fixed Length Principle). The Arm's Length Principle (ALP), on the other hand, is the principle under which tax authorities levy taxes on global groups of firms. Tax authorities determine the tax obligations of businesses engaged in overseas transactions using the ALP principle. Since multinational businesses conceal their transactions to avoid paying taxes, they provide data that is identical to those of unregulated transactions, making it impossible for the authorities to distinguish between the two using this principle. Therefore, the FLP concept should be used by the authorities (Bartels, 2005; Béland, 2017; Bento, 2009; Berchin et al., 2019; Berg et al., 2020; Bergquist et al., 2020; Bernasconi & Espinosa-Cristia, 2020; Carattini et al., 2018; Carfora et al., 2021; Cascajo et al., 2018; Cruz-Castro & Sanz-Menéndez, 2016; Dancygier & Laitin, 2014). According to the FLP concept, controlled transaction corporations successfully handle transactions while evading taxes. International corporations will therefore be required to pay a fixed amount of tax plus the minimum under the FLP principle (AICPA, 2017; Challoumis, 2019g; Grove et al., 2020; Maier, 2012; Muñoz & Flores, 2020). Therefore, the money cycle is strengthened, as larger companies generally receive money from society and the economy and save it in international banks. As a result, society loses this money, which lowers spending. According to the FLP principle, local and domestic companies that save their money in local banks should have lower tax rates.

The FLP principle supports the Cycle of Money theory which states that small and medium-sized businesses must pay less in taxes than larger corporations that take over their commercial operations. On the other hand, the ALP principle evaluates imposed taxes using the same techniques used by businesses engaging in cross-border business. The operations of smaller businesses are then covered by larger businesses. In the end, the general trend is that small and medium-sized businesses improve the distribution of money inside an economy since they frequently do not save their money outside the country's economic system but re-invest it within the system instead. As a result, the money cycle is determined by the distribution of money within the economy. Empirical papers on the theory of the cycle of money are about the cases of Poland, Montenegro, Greece, England, Thailand, Canada, etc. (Challoumis, 2021b, 2021d, 2021f, 2022b, 2023a, 2023b).

## 2. Mathematical background

The mathematical background for the Cycle of Money theory is presented below. Money cycle calculations are defined by the following mathematical formulas:

$$c_y = c_m - c_\alpha \quad (1)$$

$$c_y = \frac{dx_m}{dm} - \frac{dx_m}{da} \quad (2)$$

$$i_{cy} = Y \cdot b_d \quad (3)$$

$$g_{cy \text{ Country}} = \frac{c_{y \text{ country's}}}{c_{y \text{ Average}} + c_{y \text{ country's}}} \text{ or } \frac{i_{cy \text{ country's}}}{i_{cy \text{ Average}} + i_{cy \text{ country's}}} \quad (4)$$

$$g_{cy \text{ Average}} = \frac{c_{y \text{ Average}}}{c_{y \text{ Average}} + c_{y \text{ Average}}} \text{ or } \frac{i_{cy \text{ Average}}}{i_{cy \text{ Average}} + i_{cy \text{ Average}}} = 0.5 \quad (5)$$

It is the velocities of  $c_m$  and  $c_\alpha$  that determine the cycle of money,  $c_y$ . The cycle of money determines the flow of money in an economy. The  $c_m$  is about the financial liquidity, it is the velocity of transactions, and  $c_\alpha$  is the velocity of escaped savings. The  $i_{cy}$  indicator of the money cycle, it is GDP, and  $Y$  is the bank reserves of each country represented by  $b_d$ . In addition, the general indicator of the money cycle of each country is represented by the indicator  $g_{cy \text{ country}}$  and  $i_{cy \text{ country's}}$  or  $c_{y \text{ country's}}$  is the international indicator of  $i_{cy \text{ Average}}$  or  $c_{y \text{ Average}}$ . In conclusion, it is the international  $g_{cy \text{ Average}}$  indicator and is perceived as an international constant. The appropriate assumption is  $c_y$  aimed at establishing the link between the indicator of the international (global) average,  $c_y$  bank holdings and GDP per capita, considering econometric approaches. Subsequently, the initial assumption of the money cycle is verified in the context of real economic scenarios in most countries internationally, divided by the international average of the money cycle index. Eq. (4) and (5) mean that if an economy is approximately 0.5 can directly address an economic crisis. The perfect economy takes a value of 1. Every 0.1 that an economy loses from the unit means that it takes 3 to 5 years for that economy to recover from an economic crisis (this was identified based on the results obtained from this research). The results approaching the value of 0.5 represent an appropriate indicator of the money cycle, revealing an adequate economic structure for society and proper distribution of money among citizens – consumers. Eq. (1) The money cycle, used to define it  $c_{y \text{ country's}}$  and  $c_{y \text{ Average}}$ .

In the light of GDP, the money cycle in quantitative analysis is an expression of  $\frac{\partial(\text{GDP})}{\partial(S+I+X)}$ , according to  $\frac{dx_m}{dm}$  and  $-\frac{\partial(\text{GDP})}{\partial(S'+I'+M)}$ , according to  $\frac{dx_m}{da}$ . Next,

$$c_y = d(\text{GDP}) = \frac{\partial(\text{GDP})}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(\text{GDP})}{\partial(S'+I'+M)} d(S'+I'+M),$$

$c_y = \frac{dx_m}{dm} - \frac{dx_m}{da}$  of Eq. (2), where  $S$  means savings,  $I$  is investments and  $X$  is exports.

Then,  $S'$  is savings directed to banks outside the financial system,  $I'$  is investments directed to banks outside the financial system and  $M$  is about imports. Hence, the money cycle expresses GDP under the following relationship:

$$Y = S_T + I_T + (X - M), \text{ or } Y = (S - S') + (I - I') + (X - M) \text{ or } Y = \Delta S + \Delta I + (X - M).$$

According to the theoretical background for the Cycle of Money theory, money lost from an economy as a result of economic transactions can be controlled and supervised by an agency that will observe money transfers between the economies of different countries by comparing economies internationally through  $\Delta S$ ,  $\Delta I$  and  $(X - M)$ .

The cycle of money indicator is:

$$c_{ytotal} = \sum_{i=1}^n \sum_{t=1}^m c_{yi,t} = \sum_{i=1}^n \sum_{t=1}^m \left[ \frac{\partial(\text{GDP})}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(\text{GDP})}{\partial(S'+I'+M)} d(S'+I'+M) \right]_{i,t}.$$

The money cycle is an expression of the difference between the differential equations of the amount of money used in an economy and the quantity of money lost from the economy. That is why the money cycle theory advocates higher taxation of companies.

### 3. Quantified estimations on the currency rate

The inflation in the Cycle of Money theory is the following:

$$c_y = \frac{dx_m}{dm} - \frac{dx_m}{da} = c_{ytotal} = \sum_{i=1}^n \sum_{t=1}^m c_{yi,t} = \sum_{i=1}^n \sum_{t=1}^m \left[ \frac{\partial(\text{GDP})}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(\text{GDP})}{\partial(S'+I'+M)} d(S'+I'+M) \right]_{i,t} \quad (6)$$



Therefore,

$$\begin{aligned} \frac{\partial c_{ytotal}}{\partial t} &= \sum_{i=1}^n \sum_{t=1}^m (c_{yi,t} - c_{yi,t-1}) = \\ &= \sum_{i=1}^n \sum_{t=1}^m \left[ \frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'+I'+M) \right]_{i,t} - \\ &- \sum_{i=1}^n \sum_{t=1}^m \left[ \frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'+I'+M) \right]_{i,t-1} \end{aligned} \quad (7)$$

Then, the result is the following:

$$x = \frac{\partial c_{ytotal}}{\partial t} = x_t - x_{t-1} \quad (8)$$

where  $x$  is the amount of money in the economy.

Furthermore,

$$\pi = p_t - p_{t-1} \quad (9)$$

where  $\pi$  is inflation and  $p$  is price.

$$\begin{aligned} c_y &= \frac{dx_m}{dm} - \frac{dx_m}{da} = c_{ytotal} = \sum_{i=1}^n \sum_{t=1}^m c_{yi,t} = \\ &= \sum_{i=1}^n \sum_{t=1}^m \left[ \frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'+I'+M) \right]_{i,t} \end{aligned}$$

Namely,

$$\begin{aligned} \frac{\partial c_{ytotal}}{\partial t} &= \sum_{i=1}^n \sum_{t=1}^m (c_{yi,t} - c_{yi,t-1}) = \\ &= \sum_{i=1}^n \sum_{t=1}^m \left[ \frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'+I'+M) \right]_{i,t} - \\ &- \sum_{i=1}^n \sum_{t=1}^m \left[ \frac{\partial(GDP)}{\partial(S+I+X)} d(S+I+X) - \frac{\partial(GDP)}{\partial(S'+I'+M)} d(S'+I'+M) \right]_{i,t-1} \end{aligned}$$

where  $\Delta t = 1$ , since the difference between the times is  $t - 1$  and  $t$ .

It is therefore assumed that:

$$x = \frac{\partial c_{ytotal}}{\partial t} = x_t - x_{t-1} \tag{10}$$

where  $x$  is the sum of the quantity of money in an economy.  
Therefore,

$$\pi = p_t - p_{t-1} \tag{11}$$

where  $\pi$  is inflation and  $p$  is price.

As a result, we receive the following relationships (Table 1):

**Table 1. Relationship between inflation and money cycle**

| Calculation  | Result              | Cycle of Money (CM)    |
|--------------|---------------------|------------------------|
| $\pi = x$    | zero inflation      | constant money cycle   |
| $\pi > x$    | inflation           | declining money cycle  |
| $\pi < x$    | deflation           | declining money cycle  |
| $\pi \leq x$ | no inflation/domism | increasing money cycle |

Source: author's own elaboration.

In support of the above equations, the following result takes place:

$$e = \frac{x_t - x_{t-1}}{p_t - p_{t-1}} \tag{12}$$

Therefore,

$$e = \frac{x}{\pi} \tag{13}$$

where  $e$  becomes parity.

The Table 2 is given on the question of parity.

**Table 2. Currency rate in the theory of the Cycle of Money**

| Calculation  | Result              | Parity                             | Cycle of Money (CM) |
|--------------|---------------------|------------------------------------|---------------------|
| $\pi = x$    | zero inflation      | fixed exchange rate, $e = 1$       | constant CM         |
| $\pi > x$    | inflation           | exchange rate reduction, $e < 1$   | reduced CM          |
| $\pi < x$    | deflation           | exchange rate increased, $e > 1$   | reduced CM          |
| $\pi \leq x$ | no inflation/domism | exchange rate increase, $e \geq 1$ | increased CM        |

Source: author's own elaboration.

In the Cycle of Money theory, the quantity of money is increased, but no inflation is mentioned. Furthermore, the currency rate is increased because of the increase in productivity of the economy, meaning an increase in the distribution and reuse of money. As a result, it shows better function and structure of the economy. Domism is the case where an increase in the money cycle comes from a better structure and function of the economy.

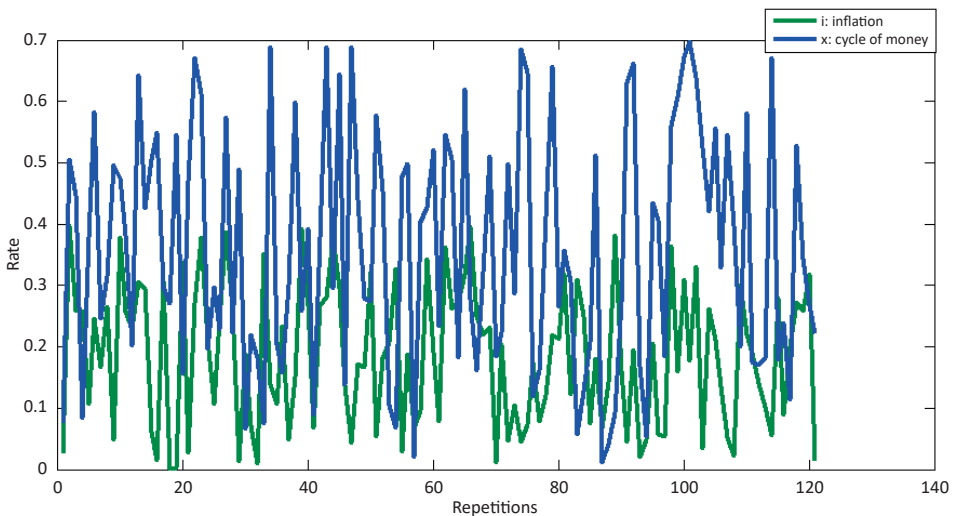
The Table 3 presents a QE analysis of the data.

**Table 3. QE method application**

| Variables            | Value |
|----------------------|-------|
| $x$ (cycle of money) | 0.7   |
| $i$ (inflation)      | 0.4   |
| $e$ (currency rate)  | 1.75  |

Source: based on: (Challoumis, 2019e).

The blue line depicts the money cycle in the scenario where it is higher than inflation. Similar findings apply to the remaining two situations in Table 3. Due to the high cycle of money and the appropriate distribution and reuse of money in this economy, there is little inflation and a high currency rate (Figure 2).



**Figure 2. The Cycle of Money in comparison with inflation**

Source: author's results.

## Conclusions

This study has shown that inflation is caused not only by rising prices but also by a mismatch between price growth and productivity growth. In the theory of the money cycle, productivity refers to the distribution and reuse of money in an economy. An economy is represented by its function and structure, which is reflected in the money cycle, i.e. problems in the functioning of the economy are reflected in the structure of the economy and vice versa – productivity and structure of the economy are two sides of the same coin, i.e. they are inseparable. Inflation reduces the cycle of money, which is reflected in the exchange rate by lowering it.

Key aspects of inflation as they relate to the Cycle of Money theory have been discussed in this paper. The findings highlight the significance of the money cycle if economies experience inflation. Any economic crisis can be handled by economies with efficient money allocation and recycling. The economy now has an acceptable economic structure as a result of the efficient allocation of financial resources (Challoumis, 2018d, 2018f, 2020a, 2020d, 2021e). This means that the economy has no international and large companies that substitute the economic activities of the smaller ones.

The SMEs (Small and Medium Enterprises) are the main body of each economy, and according to the Cycle of Money theory should have lower taxes than bigger companies that substitute their activities. In conclusion, the high cycle of money leads to lower inflation, offering a higher currency rate. This happens because of better distribution and reuse of money, meaning at the same time better economic structure, as SMEs have a full economic function because the high capital companies have transferred their activities to factories and high technological units (Challoumis, 2019g; Porter, 2007; Sikka, 2018; Van de Vijver et al., 2020; Woody & Viney, 2017).

## Appendix

The following program in Matlab has been used to receive the prior results:

```
%Q.E. currency rate Constantinos Challoumis 2023 (c) (r) all rights reserved

t=0;
while t<10
t=t+1;
if rand()<9
x=0.7*rand();
end

if rand()<9
i=0.4*rand();
end

e=x/i;

tab=[x,i;tab]; %initially remove tab

end
```

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